

Your name: _____ Your student number: _____

**Department of Computer Science
University of Saskatchewan
CMPT 370-03**

**Midterm Examination
October 25, 2001**

Time Limit: 75 minutes

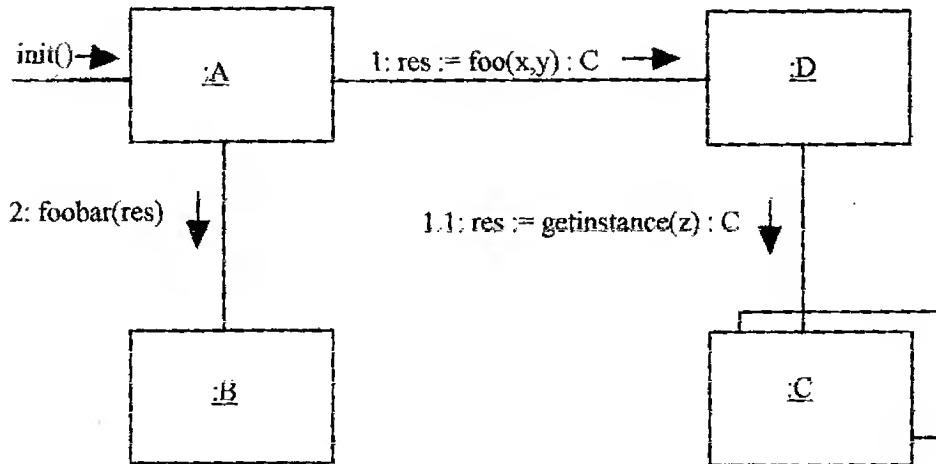
Total Marks: 55

*This is a **closed book** exam. Please write your answers legibly in the space provided **on the examination paper**. In the discussion questions you may use point form as long as your answer is coherent. If you need more space, use the back of the page. Rough work can be done in the answer booklets. Be sure to budget your time appropriately so you can **answer all questions**. The number of marks assigned to each question is a rough guide as to the relative amount of time to spend on that question.*

1. What does Larman mean when he recommends “agile” application of the UP? [2 marks]

2. Many engineers view their discipline as a spin-off of a related science: chemical engineering from chemistry, electrical engineering from theories of electro-magnetism, etc. In this view there can be a separation of science from engineering, with science investigating the foundational issues and engineering working on the applications. Does this view make sense for software engineering? Why or why not? Discuss. [4 marks]

3. Consider the following collaboration diagram and answer the questions below.
 [Total marks: 15]



(a) Write down the sequence in which these objects are invoked. [2 marks]

(b) For each object indicate which other objects are *visible* to that object and what kind of visibility it is. [4 marks]

(c) Draw a *design class diagram* corresponding to this collaboration diagram. [5 marks]

(d) Redraw this collaboration diagram as an equivalent *sequence diagram*. [4 marks]

4. Indicate which of the four main factors of good GUI design is being violated in each of the following scenarios. Choose only the single most significant violation in each case. [4 marks]

(a) A customer is using an on-line banking service to pay bills. S/he enters each bill quantity on successive lines of the interface. After the last quantity is entered, the customer has to move all the way back to the top of the screen to push a button to indicate that s/he is done.

(b) Clerks in the accounting department of a major company must electronically access many invoices generated by the accounts receivable subsystem. The invoices look very different from each other, often causing some confusion.

(c) A website is designed to be really flashy with lots of colour, fancy fonts, etc., but it is very hard to actually find any information.

(d) An interface designer is a hardcore Macintosh user and designs interface widgets in the Mac style even for PC users.

5. *This is a design question.* Imagine that the Department of Computer Science has decided to automate parts of its graduate student admission process. Here's a simplified version of how the process works now. Typically, a potential graduate student contacts the Department about their interest in pursuing graduate studies here, and the Department sends back to them (by post) a blank application form and blank forms for their external referees to fill out. The student fills out the application form and sends it to the Department (by post). The student also passes on the referee forms to 3 people (who know him or her well) and asks each of these people to write their evaluation of the student on the referee form and send it directly to the Department (by post). Finally, the student asks the University at which they have completed their prior degree(s) to send an official transcript of their marks to the Department (by post). Once the Department gets all of the relevant documentation, a Department committee makes a recommendation on admission and possible funding, contacts the student about the recommendation (by post), and forwards the recommendation (and accompanying documentation) by campus mail to the University College of Graduate Studies and Research for further processing.

5 (continued)

There are three main initial goals of the automation effort: (i) to institute electronic communication at all stages so as to eliminate the delays brought on by shuffling hard copies of documents around the world by post (and around the University by campus mail); (ii) to create a database to store all of the information being accumulated about each applicant; and (iii) to implement a tracking system that helps the Department to monitor the progress of each student's application from initial contact to final decision. [Total marks: 30]

(a) Draw a *domain model* for the *current* system. Include objects, associations, multiplicities (cardinalities), and important attributes for each object. [7 marks]

(b) Draw a *use case diagram* containing the main uses cases in the *current* system. [3 marks]

5 (continued)

(c) Briefly describe (one or two sentences each) the activities that would occur in the *new* system at each of the three layers discussed in class (interface, domain, service). [3 marks]

(d) Assume there is an operation **queryStatus** that has been identified as an important part of the tracking sub-system. **queryStatus** returns a list of documents still missing from a student's application. Write a *software contract* for **queryStatus**. [4 marks]

5 (continued)

(e) Draw a *collaboration diagram* for **queryStatus** [7 marks]

(f) Explain which design patterns were used and where in creating the collaboration diagram in part (e). Stick to the GRASP patterns. [3 marks]

(g) Can you suggest any particular possible serious “social issues” that arise in making all communications electronic in the new system? [3 marks]